

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) A method of speaker normalization comprising:

~~a feature parameter extracting step of segmenting an input speech utterance into frames of a constant time length to have frames and extracting an acoustic feature parameter of each of the frames;~~

~~a frequency converting step for each of the frames, frequency-converting the respective acoustic feature parameter by using plural filtering with a plurality of predetermined frequency conversion coefficients previously defined to form a corresponding plurality of frequency-converted feature parameters;~~

~~a step of using all the combinations of plural post-conversion feature parameters obtained by the frequency conversion and at least one standard phonemic model, to compute plural determining, for each frame, a plurality of similarities or distances between the post-conversion feature each of the frequency-converted feature parameters of each of the frames and the and a standard phonemic model;~~

~~a step of deciding selecting at least one of the plurality of predetermined frequency conversion coefficients, representing a frequency converting condition for normalizing the input utterance, by using the plural determined plurality of similarities or distances for each of the frames; and~~

~~a step of normalizing the input utterance by frequency-converting the input utterance using the frequency converting condition selected at least one predetermined frequency conversion coefficient.~~

2. (Currently Amended) A method according to claim 1, wherein the step of ~~selecting at least one of the deciding a predetermined frequency converting condition~~ conversion coefficients includes ~~has~~ a step of mutually comparing between the determined plural plurality of similarities or distances included in an input frame constituted by the frame, a step of

selecting for each frame a maximum likelihood, combination of a phoneme and ~~a-at least one of the plurality of predetermined frequency conversion coefficient-coefficients~~ by using a result of ~~the comparison~~, and a step of cumulating the frequency of the frequency conversion coefficient in a maximum likelihood over plural frames and ~~deciding-a selecting at least one of the plurality of predetermined frequency conversion coefficients in-having a highest frequency as a-the frequency converting condition.~~

3. (Currently Amended) A method according to claim 1, wherein the step of ~~deciding-a selecting at least one of the predetermined frequency converting condition-conversion coefficients includes a~~ has a step of mutually comparing between the ~~determined plural-plurality of similarities or distances included in an input frame constituted by the frame~~, a step of selecting a set of a phoneme of the standard phonemic model and ~~a-at least one of the plurality of predetermined frequency conversion coefficient-coefficients~~ that provides a result of maximum likelihood, and a step of ~~deciding-the selected selecting at least one of the plurality of predetermined frequency conversion coefficient-coefficients as a-the frequency converting condition of the frame.~~

4. (Currently Amended) A method according to claim 1, wherein the step of ~~determining the plurality of computing-a similarity-similarities or distance-distances further includes a step of computing-determining~~, for each frame, a ratio in similarity or distance of the phoneme as a weight by using the ~~frame-based~~ acoustic feature parameter of the frame and the standard phonemic model, the step of ~~deciding-a selecting at least one of the plurality of predetermined frequency conversion coefficients converting condition-being including~~ a step to decide ~~select~~ the frequency converting condition by using the weight.

5. (Currently Amended) A method according to claim 4, wherein the step of ~~computing-the determining the ratio in~~ similarity or distance of the phoneme as ~~a-the~~ weight includes a step of selecting for each frame ~~a-at least one of the plurality of predetermined frequency conversion coefficient-coefficients in~~ a maximum likelihood with respect to all the phonemes of the standard phonemic model, a step of deciding a phoneme-based frequency converting condition for all the phonemes, on all the phonemes of the standard phonemic model, from a result of cumulating phoneme by phoneme the frequency converting condition in ~~a-the~~ maximum likelihood over ~~a-plural~~ frames, and a step of using the phoneme-based frequency converting condition and the similarity or distance, to decide for each frame ~~a-the~~

weight for the phoneme-based frequency converting condition, wherein the step of deciding ~~selecting at least one of the plurality of predetermined~~ frequency converting condition ~~decides conversion coefficients selects a the~~ frequency converting condition for the frame by using the weight on the phoneme-based frequency converting condition.

6. (Currently Amended) A method according to claim 1, wherein, said step of ~~selecting at least one of the plurality of predetermined deciding—~~ frequency conversion coefficients ~~converting—condition~~ employs at least vowels in determining the plurality of comparing similarities or distances.

7. (Currently Amended) A method according to claim 1, wherein, said step of ~~selecting at least one of the plurality of predetermined deciding—~~ frequency conversion coefficients ~~converting—condition~~ employs only vowels in ~~comparing—determining the plurality of~~ similarities or distances.

8. (Currently Amended) An apparatus for speech recognition comprising:

a feature parameter extracting section for segmenting an input speech utterance into frames of a constant time length to have frames and extracting an acoustic feature parameter of each frames/frame;

a frequency converting section for, for each frame, frequency-converting the respective acoustic feature parameter by ~~using plural~~ filtering with a plurality of predetermined frequency conversion coefficients ~~previously defined to form a corresponding plurality of frequency-~~ converted feature parameters;

a similarity or distance computing section for ~~using all combinations of plural post-conversion feature parameters obtained by the frequency conversion and at least one standard phonemic model, to compute plural determining, for each frame, a plurality of similarities or distances between the post-conversion~~ each of the frequency-converted feature parameter parameters of each frames and the a standard phonemic model;

a frequency converting condition deciding section for ~~deciding selecting at least one of the plurality of predetermined frequency conversion coefficients, representing a frequency~~

converting condition for normalizing the input utterance, by using the determined plurality of plural-similarities or distances for each of the frames; and

a speech-recognition processing section for recognizing a speech by using the input utterance and a subject-of-recognition acoustic model;

whereby ~~wherein~~ the input utterance is normalized by frequency-converting the input utterance using the selected at least one predetermined frequency conversion coefficient ~~determined frequency-converting condition~~ thereby effecting speech recognition.

9. (Currently Amended) An apparatus according to claim 8, wherein the frequency converting condition deciding section mutually compares between the determined plural plurality of similarities or distances included in an input frame constituted by the frame, selects for each frame a maximum likelihood of combination of a phoneme and ~~a-at least one of the plurality of predetermined frequency conversion coefficient-coefficients~~ by using a result of the comparison, and cumulates the frequency of the frequency conversion coefficients in the maximum likelihood over the plural frames and ~~decides-a~~selects at least one of the plurality of predetermined frequency conversion coefficient-coefficients highest in frequency as a-the frequency converting condition.

10. (Currently Amended) An apparatus according to claim 8, wherein the frequency converting condition deciding section mutually compares between the determined plurality of similarity degrees-or distances included in an input frame constituted by the input frame, selects a combination of a phoneme of the standard phonemic model and ~~a-at least one of the plurality of predetermined frequency conversion coefficient-coefficients~~ that provides a result of maximum likelihood, and ~~decides-the-selected~~selects at least one of the plurality of predetermined frequency conversion coefficient-coefficients as a-the frequency converting condition of the frame.

11. (Currently Amended) An apparatus according to claim 8, wherein the similarity or distance computing section computes, for each frame, a ratio in similarity or distance of the phoneme as a weight by using the ~~frame-based~~ acoustic feature parameter of the frame and the standard phonemic model, the frequency converting condition deciding section ~~deciding~~ selecting the frequency converting condition by using the weight.

12. (Currently Amended) An apparatus according to claim 11, wherein the similarity or distance computing section selects for each frame ~~a~~ at least one of the plurality of predetermined frequency conversion coefficient-coefficients in a maximum likelihood with respect to all the phonemes of the standard phonemic model, decides a phoneme-based frequency converting condition for all the phonemes, on all the phonemes of the standard phonemic model from a result of cumulating phoneme by phoneme the frequency converting condition in a maximum likelihood over plural frames, and uses the phoneme-based frequency converting condition and the similarity degree-or distance, to decide ~~a~~ the weight for the phoneme-based frequency converting condition for each frame, wherein the frequency converting condition deciding section ~~selects~~ decides ~~at~~ the frequency converting condition for the frame by ~~reflecting~~ using the weight on the phoneme-based frequency converting condition.

13. (Currently Amended) An apparatus according to claim 8, wherein said frequency converting condition deciding section employs at least vowels in determining the plurality of similarities or distances.

14. (Currently Amended) An apparatus according to claim 8, wherein said frequency converting condition deciding section employs only vowels in determining the plurality of ~~comparing~~-similarities or distances.

15. (Original) An apparatus according to claim 8, comprising a frequency converting condition process display section for displaying, for a user, intermediate data obtained by an internal process of the frequency converting condition deciding section.